Sample Exam Questions

The following questions are examples of multiple-choice questions across the core competencies, similar to the questions in the BCPE exam. These sample questions are verified, but are not statistically validated. Therefore, the level of difficulty might not reflect that of the exam. Questions in the exam are statistically validated.

Answers to the sample questions are on pages following the questions. Please refer to the exam reference list for sources of these questions.

<table>
<thead>
<tr>
<th>Number</th>
<th>Question</th>
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</table>
| 1      | As the discipline of Human Factors/Ergonomics evolved, the person-machine system broadened and now comprises:  
a. elements or people having direct control over machines or tools  
b. interface elements between the humans and non-human elements  
c. elements, people, or other sources having some control over machines or tools  
d. elements or people having indirect control over hardware |
| 2      | System design is a complex process that proceeds over time in an atmosphere of uncertainty. The systems process is influenced by many factors – behavioral, physical, technical, and organizational. Which of the following affect design?  
a. project team certifications, engineering specification, development constraints, and post production timeline  
b. project organization and management, environmental constraints, multidisciplinary nature of the team, and nature of design problem  
c. design problem constraints, strategies for solutions, hardware and software, and profit margin  
d. management interest in quantity, strategies for solutions, statistical analyses, and availability of certified ergonomists |
Los Angeles has decided to build a state-of-the-art command and control center for natural disasters, such as earthquakes and wild fires. You have been retained to ensure the design of the center considers all aspects of the human-machine system. These aspects include

a. person, task, equipment, capabilities, demands, and simulation
b. hardware, software, firmware, and operating system interfaces
c. person, task, equipment, software, and user availability
d. person, task, equipment, and environment (organizational, social, physical, policy)

While the system design process is considered fundamental to ergonomics/human factors, what other approaches focus on the system design process?

a. linear sequence of activities where input affects output
b. concept design, physical prototype, production, and evaluation
c. human-computer interface design, biomechanics, testing and evaluation, and cost analysis (return on investment)
d. sociotechnical systems, participatory ergonomics, user-centered design, computer-supported design, and ecological interface design

In designing an industrial sewing machine that will be sent to China for a female workforce to use to manufacture dresses, what is the popliteal height to accommodate 95% of the workforce? Use the following information and the table below.

[for Chinese females – mean=378mm; standard deviation=23mm]

<table>
<thead>
<tr>
<th>Required Percentile</th>
<th>z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>-2.58</td>
</tr>
<tr>
<td>2.5</td>
<td>-1.96</td>
</tr>
<tr>
<td>5</td>
<td>-1.64</td>
</tr>
<tr>
<td>95</td>
<td>+1.64</td>
</tr>
<tr>
<td>97.5</td>
<td>+1.96</td>
</tr>
<tr>
<td>99.5</td>
<td>+2.58</td>
</tr>
</tbody>
</table>

a. 340mm
b. 416mm
c. 339mm
d. 350mm
|   | For vigilance tasks, ability to respond to an anomaly is high at the beginning, but drops dramatically after a short period of time. What are other factors that affect vigilance performance?  
|   | a. varying signal strength, signal-to-noise ratio, and signal availability  
|   | b. break times, signal movement speed, and number of channels  
|   | c. use of coffee or other stimulants, false alarms, and work schedule  
|   | d. low signal strength, spatial or temporal uncertainty, and if only a few events happen in the background  
|   | You are hired as an ergonomist to analyze and document workplace problems on a factory floor for an assembly task. You identify high temperatures in the working environment. What is the process called that the human body uses in controlling body temperature?  
|   | a. heat stress  
|   | b. acclimatization  
|   | c. heart rate  
|   | d. thermoregulation  
|   | You are hired as an ergonomist to assess workplace problems on a factory floor for an assembly task. You identify poor interaction among the workers. What is the best approach to address the poor worker interaction issues in that workplace?  
|   | a. participatory ergonomics  
|   | b. akamiso training  
|   | c. re-training with a focus on safety  
|   | d. organizational assessment  
|   | Which of the following is a true statement about inferential statistics tests?  
|   | a. non parametric tests are based on some assumption about the distribution of the data  
|   | b. parametric tests are appropriate for nominal and ordinal data  
|   | c. parametric tests have more statistical power  
|   | d. non parametric tests are equivalent to parametric tests when the same data set is used
10. **The validity of a measure is a statement about how well the method actually measures what it is supposed to measure. Which statement best describes concurrent validity?**

   a. when a measure is reliable  
   b. when a new measure compares well to outcomes of an existing accepted measure  
   c. when a measure represents more than one concept  
   d. when a measure can be generalized into all other domains

11. **There are many definitions for task analysis. But, a simple interpretation is**

   a. the job and the people doing the job  
   b. what is the goal and who achieves it  
   c. who does what and why  
   d. the overall task broken into its subtasks and actions

12. **In developing a questionnaire to assess users likes and dislikes of a new smart phone operating system, what is a barrier to insuring the questionnaire is reliable?**

   a. questions are not understood by users  
   b. users do not want to answer the questions  
   c. answers depend on elements of the operating system changing over time  
   d. response bias

13. **The revised (1991) National Institute for Occupational Safety and Health (NIOSH) Lifting Equation does not apply if the following occurs**

   a. lifting/lowering stable objects  
   b. lifting/lowering in an unrestricted workplace  
   c. lifting/lowering while carrying, pushing, or pulling  
   d. lifting/lowering in and environment where the temperature is 79º F (26º C) and the relative humidity is 50%

14. **What are the four reference postures for computer work stations according to the Human Factors and Ergonomics Society?**

   a. reclined sitting, upright sitting, declined sitting, standing  
   b. reclined sitting, declined sitting, kneeling, standing on a fatigue mat  
   c. sitting on the floor, sitting on a chair, kneeling, standing  
   d. relaxed sitting, upright sitting, kneeling, standing on a fatigue mat
<table>
<thead>
<tr>
<th>Question</th>
<th>Correct Answer</th>
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</thead>
<tbody>
<tr>
<td>15. Which of the following is an analytic evaluation for usability?</td>
<td>d. heuristics evaluation</td>
</tr>
<tr>
<td>16. In leading the design team for a new tablet computer interface, management questions your choice to involve current users in your design, development, and evaluation phases. What is one advantage to include users?</td>
<td>a. sense of participation fosters involvement and acceptance</td>
</tr>
<tr>
<td>17. When designing 3-D visual displays, which of the following is true?</td>
<td>c. linear perspective – monocular depth cues to give a second dimension to a painting</td>
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<tr>
<td>18. The 5th to the 95th percentile rule accommodates approximately 90% of the population, but only in terms of a single dimension. Thus, accounting for both stature and weight in a design, what can be said about the 5th to the 95th rule?</td>
<td>d. when combining two or more dimensions, the 95% accommodation is reduced by 5% for each additional dimension; thus, 5th to the 95th in stature combined with 5th to the 95th in weight will accommodate 85% of the population</td>
</tr>
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</table>
According to the US Occupational Safety and Health Administration (OSHA), permissible noise limits, when exposure varies, are calculated, as follows:

\[
\text{Noise dose (D)} = 100 \times \sum \frac{C_i}{T_i}
\]

where
\[C_i\] is the total time of exposure at a given level
\[T_i\] is the total time of exposure allowed

Thus, given the following measures for Situation #1 and Situation #2 (See Tables below), is there a problem with either or both Situations?

<table>
<thead>
<tr>
<th>Situation #1</th>
<th>Exposure (hours)</th>
<th>Noise Level (dBA)</th>
<th>(C_i/T_i)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5</td>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>95</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>90</td>
<td>0.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situation #2</th>
<th>Exposure (hours)</th>
<th>Noise Level (dBA)</th>
<th>(C_i/T_i)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5</td>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>95</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>90</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td>80</td>
<td>0.14</td>
</tr>
</tbody>
</table>

a. both exceed the OSHA permissible limits of 100 dBA
b. neither exceed the OSHA permissible limits of 100 dBA
c. Situation #1 exceeds the OSHA permissible limits of 100 dBA
d. Situation #2 exceeds the OSHA permissible limits of 100 dBA

What is reflectance?

a. the proportion of light reflected by a lighted surface
b. the amount of light reflected by a surface
c. the rate at which luminous energy is generated by a light source
d. the amount of light falling on an area
<p>| | |</p>
<table>
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</table>
| 21 | **What are the major steps in cognitive task analysis?**  
   a. use experts, conduct task analysis, interview experts, implement the results  
   b. use typical users, develop task-based scenarios, observe users, analyze the data  
   c. use typical users, develop task-based scenarios, select and implement knowledge elicitation methods, implement the results  
   d. use experts, develop task-based scenarios, select and implement knowledge elicitation methods, analyze the data |
| 22 | **What are the elements of situation awareness?**  
   a. perception, comprehension, projection, analysis  
   b. perception of elements in the environment within a volume of time and space, comprehension of their meaning, projection of their status in the future  
   c. perception of elements in the environment within a volume of time and space, comprehension of their meaning, projection of their status in the future, interpretation of the results  
   d. sensing of the elements in the environment, perception of those elements, analysis of consequences, projection of alternative outcomes, interpretation of the results |
| 23 | **Why do ergonomists use task analysis?**  
   a. to gain an understanding of what people do in the jobs they carry out  
   b. to identify job errors and improve job satisfaction  
   c. to make jobs more efficient  
   d. to discover interface issues |
| 24 | **What are the stages of the instructional systems development model?**  
   a. analysis, documentation, development, testing, production  
   b. assessment, design, prototyping, testing, production  
   c. assessment, documentation, prototyping, implementation, evaluation  
   d. analysis, design, development, implementation, evaluation |
| 25 | **In macroergonomics, what is one of the criteria for selecting an effective work system design method?**  
   a. human-centered evaluation  
   b. humanized task approach  
   c. management control of the workplace  
   d. effective human performance measures |
26 | In applying the systems approach to the design of a roadway in an urban setting with an automated in-vehicle informational system, what are the elements of the design problem that should be considered?

a. driver’s age, speeding issues, roadway configuration, driver distractions, response times, roadway lighting
b. vehicle design, demographics, road-rage, display visibility
c. roadway surface design, vehicle separation, tire design, audio displays
d. road capacity, vehicle density, innovative use of tail lighting system to warn following drivers, reflectivity of the lane marking paint

27 | What is a good representation of the product life cycle?

a. conceptual phase, definition phase, design phase, testing phase, implementation phase, operations phase, maintenance phase, disposal phase
b. analysis, design, development, production, testing, re-design, post-production, retirement
c. concept definition, requirements analysis, task analysis, prototype evaluation, production, implementation, operation, retirement
d. front-end analysis, conceptual design, iterative design and testing, design of support materials, production, evaluation, operation and maintenance, disposal

28 | Human systems integration (HSI) is a technical and management concept. What are the inputs that drive the HSI process?

a. concept, design, development, production, testing
b. systems definition/development/deployment, human related technologies and disciplines, user focus
c. analysis, design, development, implementation, test and evaluation
d. user-centered design and development, participatory ergonomics (for management), user testing, implementation

29 | Given the following situation, what is the appropriate response?

You are part of a small consulting team performing an ergonomics analysis for the design of a railroad command center. Your team consists of hardware and software engineers, as well as, test managers. Since you are the lead on the team, your boss tells you to put only your name on the final report.

a. this is a common business practice
b. while this is a common business practice, you make sure your team colleagues know you appreciate their inputs
c. you tell your boss that your colleagues need to have their contribution recognized
d. you don’t tell your boss because she has promised more work for you and your colleagues
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>c. elements, people, or other sources having some control over machines or tools</td>
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<td>2</td>
<td>b. project organization and management, environmental constraints, multidisciplinary nature of the team, and nature of design problem</td>
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<tr>
<td>3</td>
<td>d. person, task, equipment, and environment (organizational, social, physical, policy)</td>
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<tr>
<td>4</td>
<td>d. sociotechnical systems, participatory ergonomics, user-centered design, computer-supported design, and ecological interface design</td>
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</tbody>
</table>
| 5      | a. $340\text{mm}$  
\[378 - (23 \times 1.64) = 378 - 37.7 = 340.3\] |
| 6      | d. low signal strength, spatial or temporal uncertainty, and if only a few events happen in the background |
| 7      | d. thermoregulation |
| 8      | a. participatory ergonomics |
| 9      | c. parametric tests have more statistical power |
| 10     | b. when a new measure compares well to outcomes of an existing accepted measure |
| 11     | c. who does what and why |
| 12     | c. answers depend on elements of the operating system changing over time |
| 13     | c. lifting/lowering while carrying, pushing, or pulling |
| 14     | a. reclined sitting, upright sitting, declined sitting, standing |
| 15     | d. heuristics evaluation |
| 16     | a. sense of participation fosters involvement and acceptance |
| 17     | d. retinal disparity – two images are fused to create a single percept characterized by depth |
| 18 | b. individuals who fall between the 5\textsuperscript{th} to the 95\textsuperscript{th} for both weight and stature are only those who fall within the intersection of those measures in a bivariate frequency distribution |
| 19 | c. Situation #1 exceeds the OSHA permissible limits of 100 dBA |
| 20 | a. the proportion of light reflected by a lighted surface |
| 21 | d. use experts, develop task-based scenarios, select and implement knowledge elicitation methods, analyze the data |
| 22 | b. perception of elements in the environment within a volume of time and space, comprehension of their meaning, projection of their status in the future |
| 23 | a. to gain an understanding of what people do in the jobs they carry out |
| 24 | d. analysis, design, development, implementation, evaluation |
| 25 | b. humanized task approach |
| 26 | a. driver’s age, speeding issues, roadway configuration, driver distractions, response times, roadway lighting |
| 27 | d. front-end analysis, conceptual design, iterative design and testing, design of support materials, production, evaluation, operation and maintenance, disposal |
| 28 | b. systems definition/development/deployment, human related technologies and disciplines, user focus |
| 29 | c. you tell your boss that your colleagues need to have their contribution recognized |